



IDENTIFICATION AND CLASSIFICATION OF CUTANEOUS MANIFESTATIONS ASSOCIATED WITH DIABETES MELLITUS: A HOSPITAL-BASED OBSERVATIONAL STUDY

Dermatology

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ABSTRACT

Background: Diabetes mellitus is a chronic metabolic disorder with multisystem involvement, including the skin. Cutaneous manifestations are frequently encountered in diabetic patients and may serve as early clinical indicators of underlying metabolic dysregulation. Systematic identification and classification of these manifestations are essential for improving recognition and clinical assessment. **Objective:** To identify and classify common cutaneous manifestations associated with diabetes mellitus. **Methods:** This hospital-based observational study was conducted in the Department of Dermatology, Venereology, and Leprology at a tertiary care center in North India. Seventy-five patients with laboratory-confirmed diabetes mellitus presenting with one or more cutaneous manifestations were consecutively enrolled. Detailed demographic data and comprehensive dermatological examinations were performed. Cutaneous findings were identified clinically and classified into predefined categories based on etiopathogenesis and clinical morphology. Data were analyzed using descriptive statistics. **Results:** The study population predominantly comprised middle-aged adults, with a slight male predominance. Type 2 diabetes mellitus accounted for the majority of cases. A wide spectrum of cutaneous manifestations was observed. Infective dermatoses formed the largest category, followed by diabetes-specific dermatoses and metabolic or insulin-resistance-related markers. Fungal infections were the most frequently identified individual manifestation, followed by bacterial infections and acanthosis nigricans. The trunk and lower limbs were the most commonly involved anatomical sites. **Conclusion:** Cutaneous manifestations in diabetes mellitus are diverse and can be systematically classified into distinct clinical categories. Recognition of these patterns facilitates early diagnosis, appropriate referral, and comprehensive care of diabetic patients. Routine dermatological evaluation should be integrated into standard diabetes management.

KEYWORDS

Diabetes mellitus; Cutaneous manifestations; Diabetic dermatoses; Skin infections; Acanthosis nigricans

INTRODUCTION

Diabetes mellitus is one of the most prevalent non-communicable diseases worldwide and poses a growing public health challenge. In addition to well-recognized microvascular and macrovascular complications, diabetes exerts significant effects on the skin. Cutaneous manifestations may precede, accompany, or follow the diagnosis of diabetes and often reflect underlying metabolic and immunological disturbances.

The skin serves as an accessible organ that frequently mirrors systemic disease. In diabetes mellitus, chronic hyperglycemia, microangiopathy, immune dysfunction, and metabolic alterations contribute to a wide range of dermatological presentations. Previous studies have reported skin involvement in nearly one-third to two-thirds of individuals with diabetes mellitus¹⁻³.

Despite their clinical importance, diabetic cutaneous manifestations are often under-recognized or fragmented across multiple diagnostic labels. A structured approach to identifying and classifying these manifestations is essential for improving diagnostic accuracy and enhancing interdisciplinary care. This study was undertaken to systematically identify and classify common cutaneous manifestations associated with diabetes mellitus in a tertiary care setting.

MATERIALS AND METHODS

Study Design And Setting

A hospital-based observational study was conducted in the Department of Dermatology, Venereology, and Leprology at Muzaffarnagar Medical College and Hospital, Uttar Pradesh.

Study Population And Sample Size

Seventy-five patients with laboratory-confirmed diabetes mellitus presenting with one or more cutaneous manifestations were included using consecutive sampling.

Inclusion Criteria

All consenting patients with a confirmed diagnosis of diabetes mellitus and associated cutaneous manifestations were included irrespective of age or sex.

Exclusion Criteria

Patients with skin disorders attributable to non-diabetic systemic

diseases or drug-induced conditions were excluded.

Clinical Assessment And Classification

All participants underwent a detailed dermatological examination performed under consultant supervision. Cutaneous manifestations were identified clinically and classified into the following categories:

- Infective dermatoses
- Diabetes-specific dermatoses
- Metabolic or insulin-resistance-related markers
- Inflammatory or autoimmune dermatoses
- Miscellaneous dermatoses

Statistical Analysis

Data were analyzed using descriptive statistics and presented as frequencies and percentages.

RESULTS

Table 1: Most patients were middle-aged, with the highest proportion in the 51–60-year age group, followed by those aged 31–40 and 41–50 years. A slight male predominance was observed. The majority of patients had type 2 diabetes mellitus, indicating that cutaneous manifestations were more commonly seen in individuals with type 2 diabetes.

Table 2: Infective dermatoses constituted the most common etiological category, affecting one-third of the patients (33.3%), followed closely by miscellaneous dermatoses (30.7%). Diabetes-specific dermatoses accounted for 14.7% of cases, while metabolic or insulin-resistance-related markers were observed in 12.0% of patients. Inflammatory and autoimmune dermatoses formed the least frequent category (9.3%), highlighting the predominance of infective and non-specific skin manifestations in diabetic patients.

Table 3: Fungal infections were the most frequent individual cutaneous manifestation (17.3%), followed by bacterial infections (13.3%). Among non-infective conditions, acanthosis nigricans (9.3%) and eczema/dermatitis (8.0%) were commonly observed. Non-healing ulcers accounted for 6.7% of cases, while xerosis and bullous disorders were less frequent (4.0% each). A substantial proportion of patients (25.3%) presented with other less common dermatoses, indicating a wide spectrum of cutaneous involvement in diabetes mellitus.

Table 4: The trunk was the most commonly affected anatomical site (44.0%), followed by the lower limbs (25.3%). Upper limb involvement was observed in 14.7% of patients, while lesions over the neck and face were less frequent. Only a small proportion of patients had lesions involving multiple sites, indicating that cutaneous manifestations in diabetes were predominantly localized rather than generalized.

Table 1: Clinico-demographic Profile Of Patients With Diabetic Cutaneous Manifestations

Variable	Number (%)
Age <30 years	5 (10.7)
Age 31–40 years	20 (26.7)
Age 41–50 years	18 (24.0)
Age 51–60 years	22 (29.3)
Age >60 years	10 (13.3)
Male	42 (56.0)
Female	33 (44.0)
Type 1 diabetes	10 (13.3)
Type 2 diabetes	65 (86.7)

Table 2: Distribution Of Cutaneous Manifestations By Etiological Category In Diabetic Patients (n = 75)

Etiological category	Number of patients	Percentage (%)
I) Infective dermatoses	25	33.3
II) Non-Infective dermatoses:		
Diabetes-specific dermatoses	11	14.7
Metabolic / insulin-resistance markers	9	12.0
Inflammatory / autoimmune dermatoses	7	9.3
Miscellaneous dermatoses	23	30.7
Total	75	100

Table 3: Frequency Distribution Of Individual Cutaneous Manifestations

Manifestation	Number (%)
Fungal infections	13 (17.3)
Bacterial infections	10 (13.3)
Acanthosis nigricans	7 (9.3)
Eczema/dermatitis	6 (8.0)
Non-healing ulcers	5 (6.7)
Xerosis	3 (4.0)
Bullous disorders	3 (4.0)
Others (prurigo nodularis, xanthomas, granuloma annulare, urticaria)	19 (25.3)

Table 4: Anatomical Distribution Of Cutaneous Lesions

Site	Number (%)
Trunk	33 (44.0)
Lower limbs	19 (25.3)
Upper limbs	11 (14.7)
Neck	7 (9.3)
Face	3 (4.0)
Multiple sites	2 (2.7)

DISCUSSION

The present study demonstrates that cutaneous manifestations associated with diabetes mellitus can be quantitatively categorized into distinct etiological groups, with infective dermatoses emerging as the most prevalent category. Approximately one-third of patients exhibited infective skin conditions, a finding consistent with multiple hospital-based studies that have attributed this predominance to diabetes-related immune dysfunction and impaired cutaneous barrier integrity^{4,6}.

Miscellaneous dermatoses constituted nearly one-third of cases in the present cohort. This group included xerosis, prurigo nodularis, xanthomas, and granuloma annulare—conditions frequently reported in diabetic populations and often linked to chronic metabolic dysregulation and microvascular compromise^{29–33}. The substantial contribution of this category underscores the heterogeneous nature of diabetic skin involvement.

Diabetes-specific dermatoses accounted for 14.7% of cases, reinforcing their diagnostic relevance as direct cutaneous expressions of the underlying disease process. Similar proportions have been documented in previous studies, where diabetic bullae, dermopathy,

and chronic ulcers were regarded as characteristic markers of long-standing diabetes mellitus^{7,8}. Metabolic or insulin-resistance-related markers such as acanthosis nigricans and acrochordons were identified in 12% of patients, aligning with literature that recognizes these lesions as visible indicators of insulin resistance and metabolic syndrome^{12, 8}.

Inflammatory and autoimmune dermatoses represented the smallest etiological category. Although less frequent, their presence highlights the complex immunological interplay associated with diabetes mellitus and has been reported variably across different populations^{10,12}. Overall, the quantitative etiological classification applied in this study provides a structured and clinically meaningful framework for understanding the dermatological spectrum of diabetes mellitus.

The predominance of trunk and lower-limb involvement observed in this study aligns with earlier reports and emphasizes the influence of local environmental and vascular factors^{10–12}. Overall, the findings reinforce the importance of pattern recognition and structured classification in the clinical evaluation of diabetic skin disease.

CONCLUSION

Cutaneous manifestations associated with diabetes mellitus are common and heterogeneous. Systematic identification and classification reveal distinct clinical patterns, with infective dermatoses and metabolic skin markers being particularly prevalent. Awareness of these classifications can aid early recognition of diabetes-related skin disease and support comprehensive patient care. Routine dermatological assessment should form an integral component of diabetes management.

Limitations

This study was conducted at a single tertiary care center with a relatively small sample size, which may limit generalizability. The cross-sectional design precludes causal inference, and histopathological confirmation was not performed for all lesions.

Ethical Approval And Consent

Ethical approval was obtained from the Institutional Ethics Committee of Muzaffargarh Medical College. Written informed consent was obtained from all participants.

Funding

No external funding was received for this study.

Conflict Of Interest

The authors declare no conflict of interest.

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